PATENT ABSTRACTS OF JAPAN

(11)Publication number : 10-340479

(43)Date of publication of application : 22.12.1998

(51)Int.Cl.

G11B 7/24
G11B 7/24
G02B 1/08
G02B 5/30
G03H 1/02
G03H 1/22
G11B 7/00
G11B 7/135

(21)Application number : 10-032834

(22)Date of filing : 16.02.1998

(71)Applicant : FUJI XEROX CO LTD

(72)Inventor : KONO KATSUNORI
NISHIKATA YASUNARI
ISHII TSUTOMU

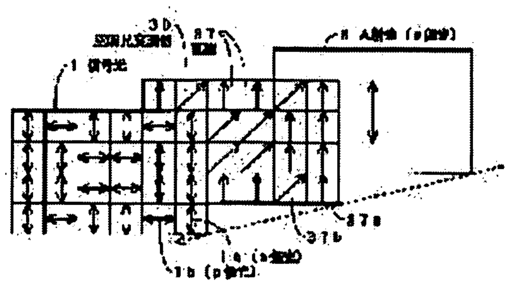
(30)Priority

Priority number : 09 94194 Priority date : 11.04.1997 Priority country : JP

(54) OPTICAL RECORDING MEDIUM, OPTICAL RECORDING METHOD, OPTICAL RECORDER, OPTICAL READING METHOD, OPTICAL READER, OPTICAL RETRIEVING METHOD, OUTPUT RETRIEVER

(57)Abstract:

PROBLEM TO BE SOLVED: To make it possible to record data at a high density and high speed and to rewrite the data at a high speed without requiring an erasing process at the time of rewriting the data and to provide an optical recording medium suitable for such recording.



SOLUTION: This optical recording medium is constituted by forming a polarization sensitive layer which exhibits photoinduced double refractiveness like a polyester having a cyanobenzene at its side chain on at least one surface side. A spatial optical modulator 30 is capable of modulating polarization. The modulator modulates the polarization of the incident light on respective pixels by applying the information of the corresponding bit of two-dimensional data as presence or absence of its voltage impression to the respective pixels. The signal light having the spatial polarization distribution

corresponding to the two-dimensional data is obtd. as the signal light 1 past the spatial optical modulator 30. This signal light 1 is cast to the optical recording medium described above and simultaneously the regions of the optical recording medium to be irradiated with the signal light 1 are irradiated with reference light. As a result, the polarization distribution of the signal light 1 corresponding to the two-dimensional data is recorded as holograms on the optical recording medium.

LEGAL STATUS

[Date of request for examination]	21.11.2002
[Date of sending the examiner's decision of rejection]	
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	
[Date of registration]	
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

Copyright (C); 1998,2003 Japan Patent Office

* NOTICES *

Japan Patent Office is not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention records data information on an optical recording medium, reads it from an optical recording medium, and the approach and equipment which are searched from an optical recording medium, and data information are recorded, or it relates to the recorded optical recording medium.
[0002]
[Description of the Prior Art] Rewritable optical disks, such as a phase change mold and an optical MAG mold, have already spread widely. Although recording density is high single or more figures if these optical disks are compared with a common magnetic disk, it is not yet enough for the digital storage of image information. In order to raise recording density, there is need, such as making the diameter of the beam spot small and shortening distance with an adjoining truck or a contiguity bit.
[0003] DVD-ROM is one of those which are being put in practical use by development of such a technique. DVD-ROM can hold the data of 4.7GByte(s) in a disk with a diameter of 12cm on one side. High density record of 5.2GByte (s) is possible for DVD-RAM in which writing and elimination are possible by both sides on a disk with a diameter of 12cm by the phase change method. This is equivalent to 3600 or more sheets of 7 or more times of read-only CD-ROM, and a floppy disk.
[0004] Thus, the densification and large capacity-ization of an optical disk are progressing every year. However, in order that the above-mentioned optical disk may record data in a field on the other hand, the recording density is restricted to the diffraction limitation of light, and 5 Gbit/cm2 called physical limitation of high density record is approached. Therefore, for the further large-capacity-izing, the three-dimension (volume mold) record including the depth direction is needed.
[0005] A photopolymer ingredient, a photorefractive ingredient, etc. are mentioned as an ingredient of the optical recording medium of a volume mold. Since these ingredients absorb a taper comparatively and produce refractive-index change, the information record by optical induction refractive-index change is possible for them. For this reason, it can use for the multiplex hologram record in which large-capacity-izing is possible.
[0006] As an example which carried out high density record using the photopolymer ingredient, a spherical wave is used for a reference beam, "SPIE Vol.2514 and 355" are made to rotate 150made from DuPont-100photopolymer which processed the disk configuration, a shift multiplex hologram is recorded on them, and having attained the recording density of 10 times or more of the recording density of CD used now (- 10 bits/micrometer 2) is shown in them.
[0007] Moreover, having carried out multiplex record of the 20,000-page hologram, and having attained record of about 1 GByte into Fe dope LiNbO3 crystal with a magnitude of 10x10x22mm, is reported to "OPTICAL ENGINEERING Vol.34 and 2193(1995)" as an example which carried out high density record using the photorefractive ingredient.
[0008] holographic memory can record mass data in this way -- in addition, since record and read-out of data can be performed two-dimensional, high-speed data logging, data read-out, high-speed data retrieval and data correlation detection, and high-speed data transfer are also possible. Concretely, the following data retrieval approaches are proposed in JP,3-149660,A.
[0009] Drawing 26 shows the search method. By this approach, while reading the two-dimensional searched data currently recorded on this by holographic one from optical memory 102 and writing that data pattern image in the space optical modulator 103 of an optical address type by the laser beam from laser 101, the two-dimensional data for retrieval are written in the space optical modulator 104 of the electric address type of a LCD (liquid crystal display) configuration.

[0010] And the laser beam from laser 105 is irradiated through an analyzer 106 as a read-out light at the space optical modulator 104 of the electric address type of a LCD configuration, the polarization condition is changed according to the data for retrieval, the transmitted light is reflected by the half mirror prism 107, and the read-out side of the space optical modulator 103 of an optical address type is made to carry out image formation.

[0011] Therefore, in the space optical modulator 103, the polarization condition of read-out light is changed according to searched data for every pixel. Two or more bits the coincidence and the inequality between searched data and the data for retrieval can be collectively detected by carrying out incidence of the read-out light to the photodetector array 109 through an analyzer 108, and detecting the existence of the read-out light from two or more pixels by the photodetector array 109 collectively.

[0012] Moreover, the following data-logging approaches and the data correlation detection approach are indicated by "A. Kutanov and Y.Ichioka:Conjugate Image Plane Correlator with Holographic Disk Memory, OPTICAL REVIEW Vol.3, No.4 (1996)258-263."

[0013] Drawing 27 shows the record approach and the correlation detection approach. By this approach, at the time of record, the two-dimensional data which it is going to record are displayed on the space optical modulator 111 of the electric address type of a LCD configuration, the Fourier transform of the signal light 112 which has the two-dimensional amplitude distribution which passed the space optical modulator 111 is carried out to the Fourier transform side P1 by Fourier transformer lens 113, optical memory 114 is irradiated, a reference beam 115 is irradiated at optical memory 114 at coincidence, and two-dimensional data are recorded on optical memory 114 as the Fourier transform hologram.

[0014] In detecting correlation, while displaying the two-dimensional data for retrieval on the space optical modulator 111 of the electric address type of a LCD configuration, the reference beam 115 at the time of record and the read-out light 116 which has a relation [****] are irradiated at optical memory 114, the hologram of two-dimensional searched data is read from optical memory 114, by Fourier transformer lens 113, the inverse Fourier transform of the read hologram is carried out to the inverse Fourier transform side P2, and it carries out incidence to the space optical modulator 111.

[0015] Therefore, a correlation peak strong against the Fourier transform side P3 of Fourier transformer lens 117 appears, and the transmitted light of the space optical modulator 111 can know correlation of a two-dimensional image etc. by detecting this, when it becomes the optical product of the data for retrieval, and searched data and the data for retrieval and searched data are in agreement.

[0016] In addition, as an optical recording medium which can rewrite a hologram, in JP,2-280116,A, the optical recording medium which consists of a polymer liquid crystal ingredient is shown, and the optical recording medium which consists of a phase change ingredient is shown in JP,4-30192,A at it.

[0017]

[Problem(s) to be Solved by the Invention] As mentioned above, holography KUMEMORI attracts attention for large-capacity-izing and improvement in the speed, and the search method as shown in drawing 26 , the record approach as shown in drawing 27 , and the correlation detection approach are also proposed in recent years. Moreover, raising S/N is also studied for high density record, and an optical-information-processing technique is also being applied.

[0018] However, in order to use the thing of the amplitude (reinforcement) modulation mold of a LCD configuration for the conventional search method shown in drawing 26 , the conventional record approach shown in drawing 27 , and the correlation detection approach as space optical modulators 104 or 111 of an electric address type, they have the following problems.

[0019] As LCD which displays data like the space optical modulators 104 or 111 is shown in drawing 28 , a polarizer 126,127 is arranged at the both sides of a liquid crystal cell 124 which have an electrode 122,123 to both sides of the liquid crystal 121 which is one of the electro-optics conversion members. Although a dichroic polarizer with the easy formation of small lightweight is used as a polarizer 126,127, since the permeability of the transparency shaft orientations is low, if it is doubled with 70 - 80% two sheets, it will produce about 50% of transmission loss.

[0020] Therefore, in performing record and read-out of data using the space optical modulator of such a LCD configuration, optical reinforcement becomes small at both times of record and reading, S/N deteriorates, and it produces the fall of hologram recording density, and the fall of retrieval precision. Moreover, if laser power is raised in order to raise signal strength, the problem to which the life of laser falls will be produced.

[0021] In record and read-out of the data in holographic memory As a noise factor which determines BER (bit error rate) (1) Photodetector arrays, such as CCD and a photodetector array etc., Fluctuation ** between the noise by the quality of a hologram and the page of the diffraction efficiency resulting from the imperfection of the diffracted light (cross talk between pages) from an adjacent hologram, the cross talk between pixels within (3) same hologram, (2) (4) crystal, or optical system and in a page is mentioned.

[0022] The information record by the amplitude (reinforcement) modulation tends to be influenced of various noises in this way, and the ratio (S/N) of signal strength and these noises influences the recording density in a record medium. Then, like other file systems, in order to stop BER low, some coding is tried.
[0023] For example, since the total optical reinforcement of the signal light at the time of record is not kept constant with data when [** and dark] carry out multiplex record of the two-dimensional data corresponding to [0, 1] at a hologram, the cross talk resulting from fluctuation of diffraction efficiency is produced. the difference which makes [light and darkness] corresponding to [[1]] corresponding to [0] for [****] in order to avoid this problem -- the coding method is used. However, the ratio of coding is set to 0.5 in this case, and the use effectiveness of a pixel becomes low.

[0024]

* NOTICES *

Japan Patent Office is not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The optical recording medium which has the polarization induction layer which consists of a light transmission nature ingredient formed in the shape of a sheet as a whole, and shows optical induced birefringence nature at least to a whole surface side.
[Claim 2] The optical recording medium which is the macromolecule or polymer liquid crystal which has the radical which said polarization induction layer photoisomerizes to a side chain in the optical recording medium of claim 1.
[Claim 3] The optical recording medium which is the macromolecule which distributed the molecule which said polarization induction layer photoisomerizes in the optical recording medium of claim 1.
[Claim 4] The optical recording medium which is that in which said radical or molecule to photoisomerize contains an azobenzene frame in the optical recording medium of claims 2 or 3.
[Claim 5] The optical recording medium which are at least one sort of monomer polymers with which said macromolecule or polymer liquid crystal was chosen from the polyester group in one optical recording medium of claims 2-4.
[Claim 6] The optical recording medium whose optical recording medium concerned is a disk configuration in one optical recording medium of claims 1-5.
[Claim 7] The optical recording approach which records polarization distribution of said signal light as a hologram into the optical recording medium by obtaining the signal light which holds data information according to space polarization distribution, and irradiating the signal light and reference beam at an optical recording medium at coincidence with the space optical modulator in which polarization modulation is possible.
[Claim 8] The optical-recording approach which records polarization distribution of a new signal light as a hologram into the optical recording medium at the same time it eliminates polarization distribution of a front signal light from the optical recording medium by obtaining a new signal light which holds data information according to space polarization distribution with the space optical modulator in which polarization modulation is possible, and irradiating the new signal light and new reference beam at the optical recording medium with which polarization distribution of a front signal light is recorded on coincidence as a hologram.
[Claim 9] The optical recording approach of rotating the polarization angle of said signal light in the optical recording approach of claims 7 or 8 according to said data information.
[Claim 10] The optical recording approach which records the hologram which is made to carry out multiplex to said hologram, changes the polarization direction of said signal light or a reference beam in the optical recording approach of claims 7 or 8, and holds data information according to optical intensity distribution or phase distribution on the same field of said optical recording medium.
[Claim 11] The optical recording approach which makes mutually the polarization direction of said signal light and a reference beam two kinds, an parallel direction and the direction which intersects perpendicularly mutually, in the optical recording approach of claim 10.
[Claim 12] The optical recording approach of said optical recording medium being a disk configuration, and moving the optical recording head containing said space optical modulator in the direction of a path of said optical recording medium in one optical recording approach of claims 7-11 while rotating said optical recording medium.
[Claim 13] Optical recording equipment equipped with the light source which emits coherent light, the space optical modulator which obtains the signal light which carries out polarization modulation of the light from said light source according to data information, and holds data information according to space polarization distribution, the image formation optical system which irradiates said signal light at an optical recording medium, and the reference beam optical system which obtains the reference beam which irradiates said optical recording medium from the light from said light source.

[Claim 14] It is optical recording equipment which said space optical modulator makes rotate the polarization angle of said signal light in the optical recording equipment of claim 13 according to said data information.
[Claim 15] Optical recording equipment which is the electro-optics conversion member into which said space optical modulator was inserted with the transparent electrode in the optical recording equipment of claims 13 or 14.
[Claim 16] Optical recording equipment said whose electro-optics conversion member is liquid crystal in the optical recording equipment of claim 15.
[Claim 17] Optical recording equipment with which said optical recording medium is a disk configuration, and the optical recording equipment concerned is equipped with the medium drive made to rotate said optical recording medium and the head migration device in which an optical recording head including said light source, a space optical modulator, image formation optical system, and reference beam optical system is moved in the direction of a path of said optical recording medium, in one optical recording equipment of claims 13-16.
[Claim 18] Optical recording equipment with which the optical recording equipment concerned contained said optical recording medium in one optical recording equipment of claims 13-17.
[Claim 19] The optical recording medium with which the signal light which holds data information according to space polarization distribution is recorded by the reference beam as a hologram.
[Claim 20] The optical recording medium with which the hologram which multiplex is carried out to said hologram, and the polarization direction of said signal light or a reference beam is changed in the optical recording medium of claim 19, and holds data information according to optical intensity distribution or phase distribution is recorded on the same field of the optical recording medium concerned.
[Claim 21] The optical recording medium whose optical recording medium concerned is a disk configuration in the optical recording medium of claims 19 or 20.
[Claim 22] The optical reading approach that the signal light which holds data information according to space polarization distribution irradiates read-out light at the optical recording medium currently recorded by the reference beam as a hologram, and reads said data information according to polarization distribution of the diffracted light from said hologram.
[Claim 23] The optical reading approach which makes the polarization direction of the aforementioned read-out light the same as that of the polarization direction of said reference beam in the optical reading approach of claim 22.
[Claim 24] The optical reading approach of carrying out incidence of the aforementioned read-out light to said optical recording medium in the optical reading approach of claim 23 from the direction of incidence of said reference beam, and the direction which counters.
[Claim 25] The optical reading approach of obtaining the diffracted light whose polarization direction corresponded with the polarization direction of said signal light in one optical reading approach of claims 22-24 by amending the polarization direction of said diffracted light with a polarizer or a wavelength plate.
[Claim 26] The optical reading approach which divides said diffracted light into two polarization components which intersect perpendicularly mutually in one optical reading approach of claims 22-25, carries out the comparison operation of both optical reinforcement, and considers the result as a reading output.
[Claim 27] The optical reading approach that the signal light which holds data information according to the rotated polarization angle irradiates read-out light at the optical recording medium currently recorded by the reference beam as a hologram, divides the diffracted light from said hologram into two polarization components which intersect perpendicularly mutually, carries out the comparison operation of both optical reinforcement, and reads said data information by the result.
[Claim 28] While being recorded by the reference beam as a hologram, the signal light which holds data information according to space polarization distribution Multiplex is carried out to this hologram and the polarization direction of said signal light or a reference beam is changed. When the hologram which holds data information according to optical intensity distribution or phase distribution irradiates the read-out light of the linearly polarized light and takes out the polarization component of a request of the diffracted light from said same field to the optical recording medium currently recorded on the same field The optical reading approach which separates and reads a desired hologram from said two or more holograms.
[Claim 29] While being recorded by the reference beam as a hologram, the signal light which holds data information according to space polarization distribution The polarization direction of said signal light and a reference beam is mutually made into two kinds, an parallel direction and the direction which intersects perpendicularly mutually. The hologram which multiplex is carried out to said hologram and holds data information according to optical intensity distribution or phase distribution The optical reading approach which separates and reads a desired hologram from said two or more holograms to the optical recording medium currently recorded on the same field when the polarization direction irradiates the read-out light which was in agreement with the polarization direction of said reference beam

and takes out the same polarization component as said signal light of the diffracted light from said same field.
[Claim 30] The optical reading approach of said optical recording medium being a disk configuration, and moving an optical read head including the optical system of the aforementioned read-out light in the direction of a path of said optical recording medium in one optical reading approach of claims 22-29 while rotating said optical recording medium.
[Claim 31] The optical reader with which the signal light which holds data information according to space polarization distribution equips the optical recording medium currently recorded by the reference beam as a hologram with the read-out light optical system which irradiates read-out light, and the polarization beam splitter and photodetector which detect polarization distribution of the diffracted light from said hologram.
[Claim 32] It is the optical reader with which the aforementioned read-out light optical system makes the polarization direction of the aforementioned read-out light the same as that of the polarization direction of said reference beam in the optical reader of claim 31.
[Claim 33] It is the optical reader which carries out incidence to said optical recording medium from the direction where the aforementioned read-out light optical system counters the aforementioned read-out light with the direction of incidence of said reference beam in the optical reader of claim 32.
[Claim 34] It is the optical reader with which said polarization beam splitter divides said diffracted light into two polarization components which intersect perpendicularly mutually in one optical reader of claims 31-33, and said photodetector consists of two photodetectors which detect the two separated polarization components separately.
[Claim 35] It is an optical reader equipped with the comparison-operation section to which the optical reader concerned carries out the comparison operation of the detection output of said two photodetectors in the optical reader of claim 34.
[Claim 36] The optical reader with which said optical recording medium is a disk configuration, and the optical reader concerned is equipped with the medium drive made to rotate said optical recording medium and the head migration device in which the optical read head containing the aforementioned read-out light optical system, a polarization beam splitter, and a photodetector is moved in the direction of a path of said optical recording medium, in one optical reader of claims 31-35.
[Claim 37] The optical reader with which the optical reader concerned contained said optical recording medium in one optical reader of claims 31-36.
[Claim 38] The optical search method to which the signal light which holds searched data according to space polarization distribution irradiates read-out light at the optical recording medium currently recorded by the reference beam as a hologram, makes the space optical modulator which carries out polarization modulation of the diffracted light from said hologram according to the data for retrieval penetrate, and detects the coincidence and the inequality between said searched data and said data for retrieval according to polarization distribution of the transmitted light.
[Claim 39] The optical search method to which the signal light which holds searched data according to space polarization distribution irradiates read-out light at the optical recording medium currently recorded by the reference beam as a hologram, makes the space optical modulator which carries out polarization modulation of the diffracted light from said hologram according to the data for retrieval penetrate, and detects correlation between said searched data and said data for retrieval according to polarization distribution of the transmitted light.
[Claim 40] The optical search method which said optical recording medium is a disk configuration, and moves the optical retrieval head containing said space optical modulator in the direction of a path of said optical recording medium in the optical search method of claims 38 or 39 while rotating said optical recording medium.
[Claim 41] Optical retrieval equipment equipped with the space optical modulator with which the signal light which holds searched data according to space polarization distribution carries out polarization modulation of the read-out light optical system which irradiates read-out light, and the diffracted light from said hologram to the optical recording medium currently recorded by the reference beam as a hologram according to the data for retrieval, and the polarization beam splitter and photodetector which detect polarization distribution of the transmitted light from this space optical modulator.
[Claim 42] It is optical retrieval equipment with which said polarization beam splitter divides said transmitted light into two polarization components which intersect perpendicularly mutually in the optical retrieval equipment of claim 41, and said photodetector consists of two photodetectors which detect the two separated polarization components separately.
[Claim 43] It is optical retrieval equipment equipped with the comparison-operation section to which the optical retrieval equipment concerned carries out the comparison operation of the detection output of said two photodetectors in the optical retrieval equipment of claim 42.
[Claim 44] Optical retrieval equipment which is the electro-optics conversion member into which said space optical

modulator was inserted with the transparent electrode in one optical retrieval equipment of claims 41-43.
[Claim 45] Optical retrieval equipment said whose electro-optics conversion member is liquid crystal in the optical retrieval equipment of claim 44.
[Claim 46] Optical retrieval equipment with which said optical recording medium is a disk configuration, and the optical retrieval equipment concerned is equipped with the medium drive made to rotate said optical recording medium and the head migration device in which the optical retrieval head containing the aforementioned read-out light optical system, a space optical modulator, a polarization beam splitter, and a photodetector is moved in the direction of a path of said optical recording medium, in one optical retrieval equipment of claims 41-45.
[Claim 47] Optical retrieval equipment with which the optical retrieval equipment concerned contained said optical recording medium in one optical retrieval equipment of claims 41-46.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the cross-section structure of the optical recording medium of this invention.
[Drawing 2] It is drawing showing the chemical formula of the chemical structure of the polyester which has a cyano azobenzene in the trans configuration of an azobenzene, cis- structure, and a side chain.
[Drawing 3] It is drawing with which explanation of the hologram by optical intensity distribution and the hologram by polarization distribution is presented.
[Drawing 4] It is drawing showing the optical system used for the experiment.
[Drawing 5] It is drawing showing the diffracted-light reinforcement to hologram chart lasting time in case the polarization directions of signal light and a reference beam are parallel, a rectangular cross, and 45 degrees.
[Drawing 6] It is drawing showing the polarization angle of the hologram diffracted light when the polarization direction of signal light and a reference beam is parallel, and the relation of optical reinforcement.
[Drawing 7] It is drawing showing the polarization angle of the hologram diffracted light in case the polarization direction of signal light and a reference beam intersects perpendicularly, and the relation of optical reinforcement.
[Drawing 8] It is drawing showing the polarization angle of the hologram diffracted light in case the polarization direction of signal light and a reference beam is 45 degrees, and the relation of optical reinforcement.
[Drawing 9] It is drawing with which explanation of the hologram multiplex record by the difference in the polarization angle of a reference beam is presented.
[Drawing 10] It is drawing showing the optical system used for the experiment.
[Drawing 11] It is drawing showing the polarization angle of the diffracted light from a hologram and the relation of optical reinforcement which were recorded on the front in rewriting.
[Drawing 12] It is drawing showing the polarization angle of the diffracted light from a hologram and the relation of optical reinforcement which were recorded on the back in rewriting.
[Drawing 13] It is drawing showing the optical recording approach of this invention, and an example of optical recording equipment.
[Drawing 14] It is drawing showing signs that a recording track is formed by the approach and equipment of drawing 13 .
[Drawing 15] It is drawing showing an example of the space optical modulator which is used for the approach and equipment of drawing 13 , and in which polarization modulation is possible.
[Drawing 16] It is drawing showing polarization distribution of the signal light by the approach and equipment of drawing 13 .
[Drawing 17] It is drawing showing an example of the optical reading approach of this invention, and an optical reader.

[Drawing 18] It is drawing showing polarization distribution of the hologram diffracted light by the approach and equipment of drawing 17 .
[Drawing 19] It is drawing showing the optical recording approach of this invention thru/or equipment and the optical reading approach of this invention thru/or other examples of equipment.
[Drawing 20] It is drawing showing the comparison-operation approach for raising S/N of a reading output.
[Drawing 21] It is drawing with which explanation of the multiplex record which changed the polarization direction of signal light is presented.
[Drawing 22] It is drawing with which explanation of data logging which rotated the polarization angle of signal light is presented.
[Drawing 23] It is drawing showing the comparison-operation approach at the time of reading at the time of rotating the polarization angle of signal light and recording data.

[Drawing 24] It is drawing showing an example of the optical search method of this invention, and optical retrieval equipment.
[Drawing 25] It is drawing showing signs that data are searched with the approach and equipment of drawing 24 .
[Drawing 26] It is drawing showing the conventional search method.
[Drawing 27] It is drawing showing the conventional record approach and the correlation detection approach.
[Drawing 28] It is drawing showing the space optical modulator of a LCD configuration used for the conventional approach.
[Description of Notations]
1 [-- The diffracted light, 7S / -- S-polarized light component,] -- Signal light, 2 -- A reference beam, 3 -- Read-out light, 4 7P [-- Optical recording medium,] -- A p-polarized light component, 8 -- A linearly polarized light part, 9 -- A elliptically-polarized-light part, 10 11 [-- Optical recording head,] -- A transparence substrate, 12 -- A polarization induction layer, 15 -- A field, 20 21 [-- 32 An electro-optics conversion ingredient, 33 / -- A transparent electrode, 40 / -- An optical read head, 41 / -- Read-out light optical system, 43 / -- A polarization beam splitter, 44, 44S 44P / -- A photodetector array, 60 / -- An optical retrieval head, 61 / -- Read-out light optical system,] -- The light source, 28 -- A shutter, 30 -- A space optical modulator, 31

[Translation done.]

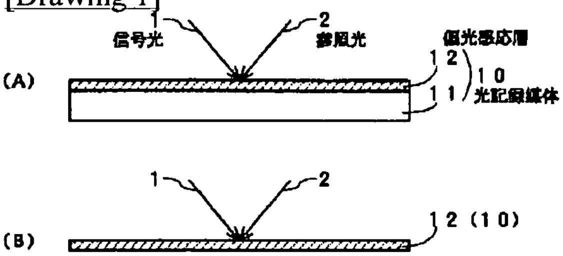
* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

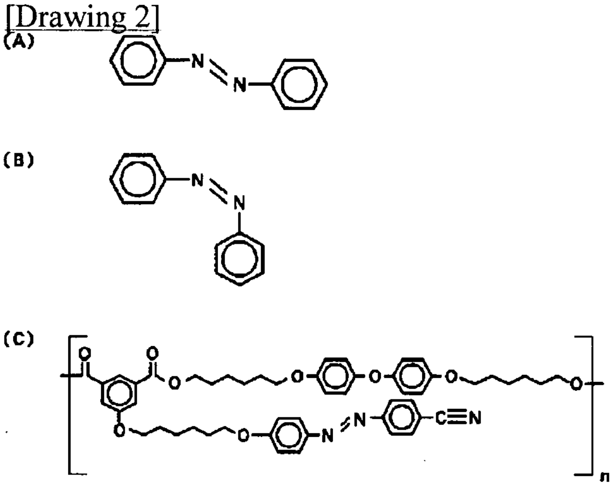
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



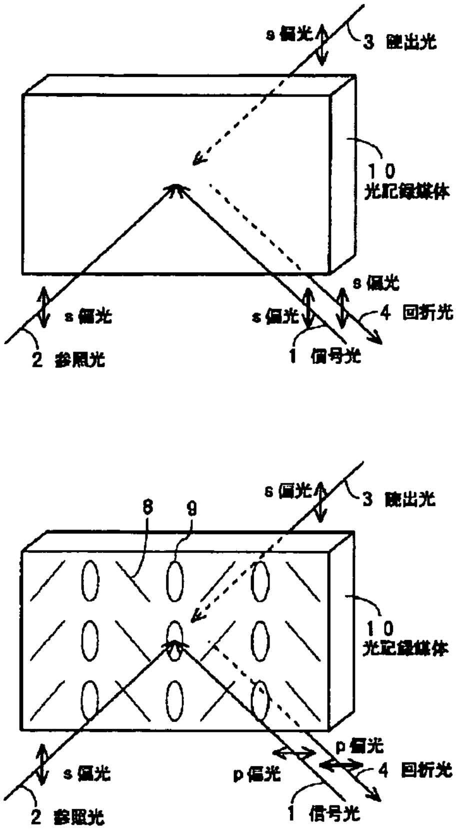
[Drawing 2]



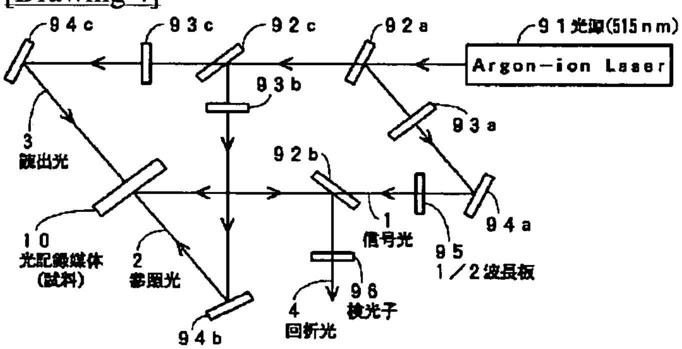
[Drawing 3]

(A)

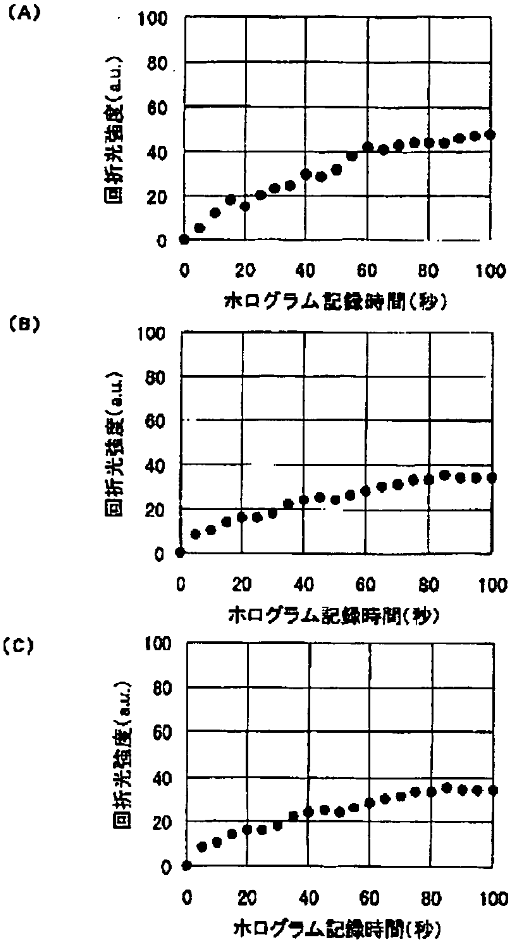
(B)



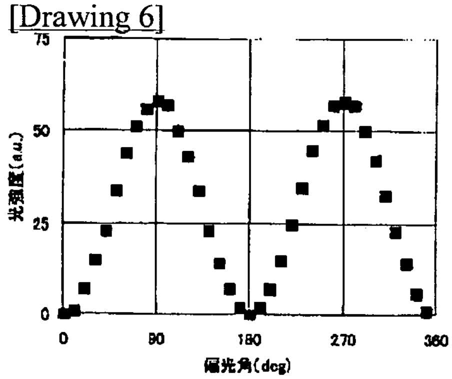
[Drawing 4]



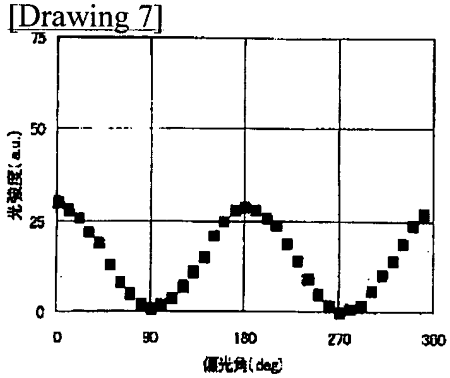
[Drawing 5]



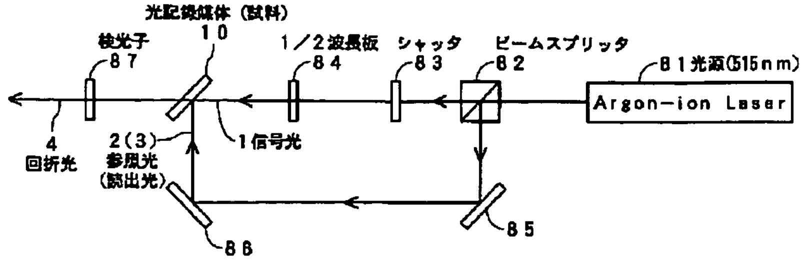
[Drawing 6]



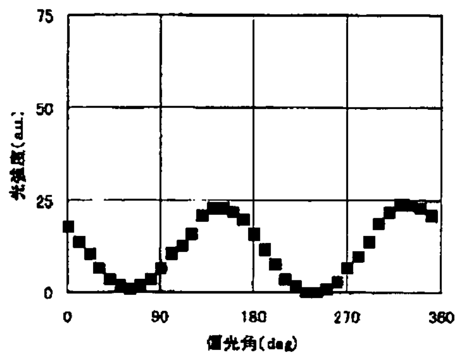
[Drawing 7]



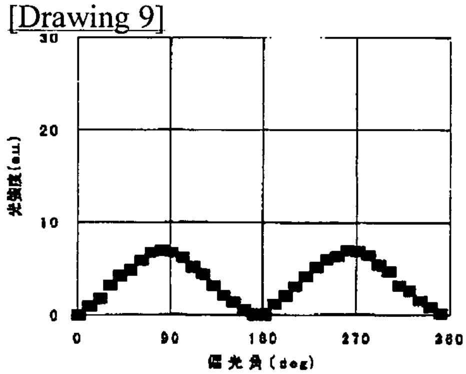
[Drawing 10]



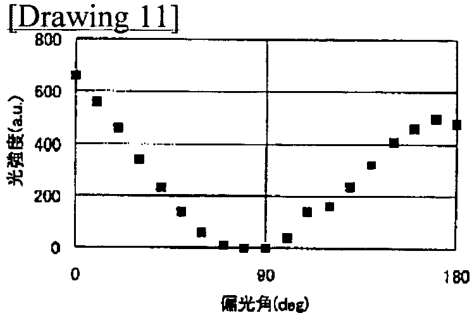
[Drawing 8]



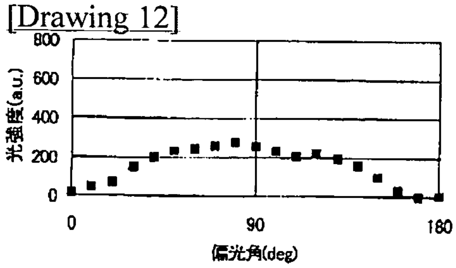
[Drawing 9]



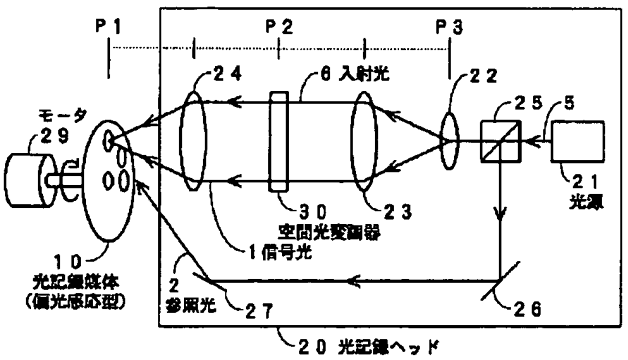
[Drawing 11]



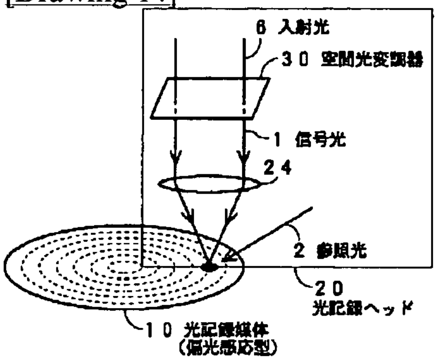
[Drawing 12]



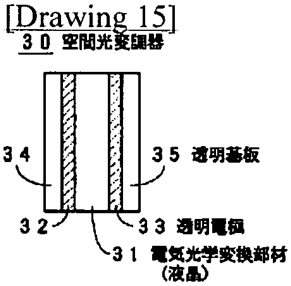
[Drawing 13]



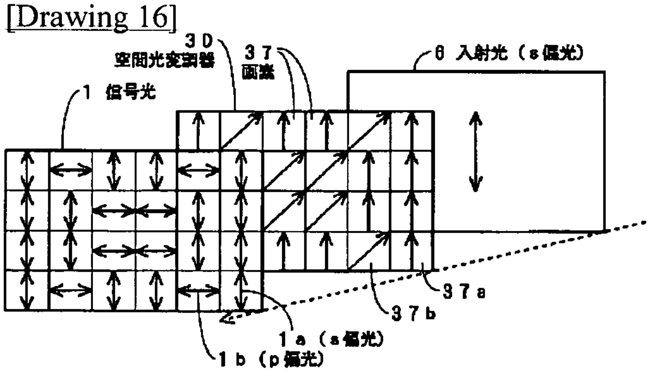
[Drawing 14]



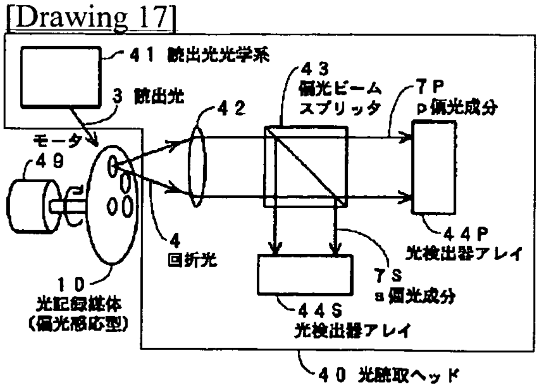
[Drawing 15]



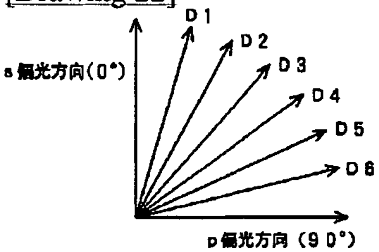
[Drawing 16]



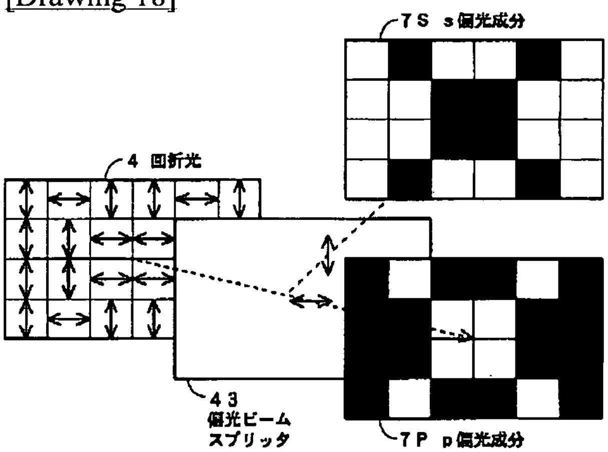
[Drawing 17]



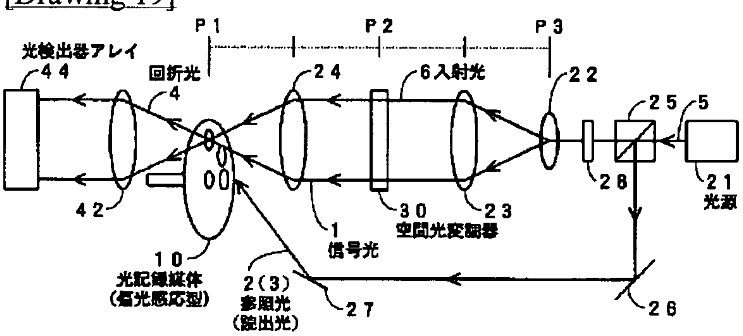
[Drawing 22]



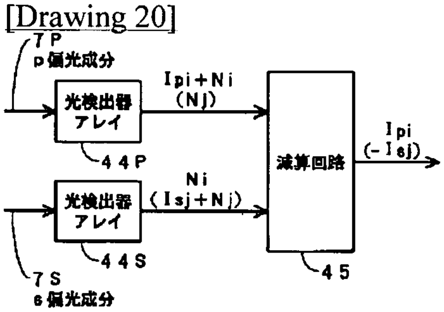
[Drawing 18]



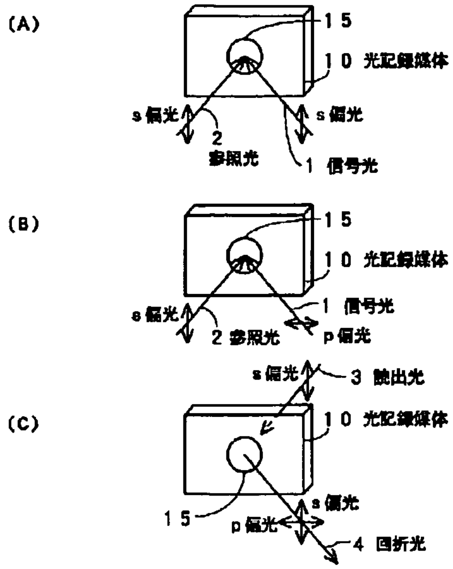
[Drawing 19]



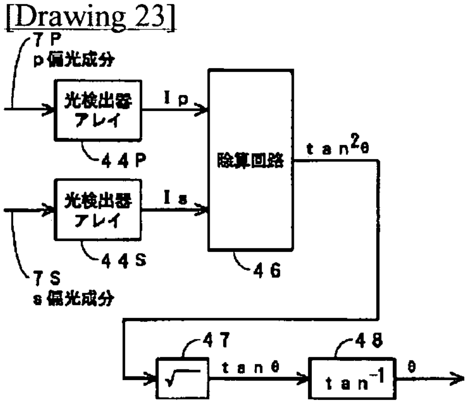
[Drawing 20]



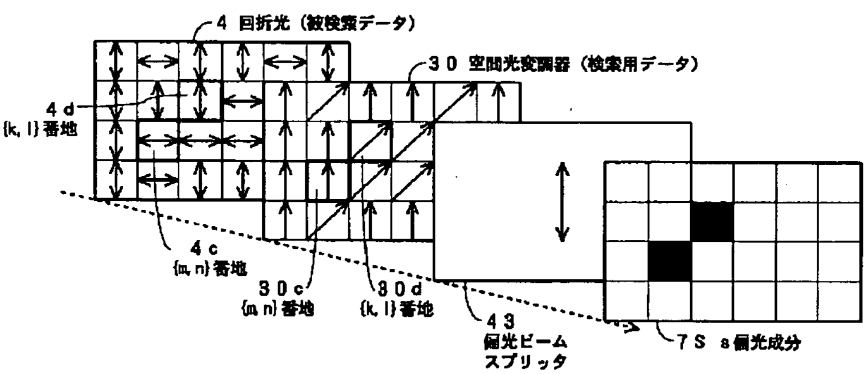
[Drawing 21]



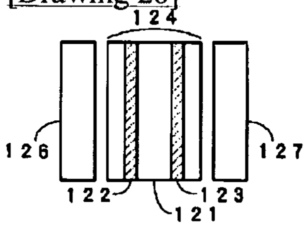
[Drawing 23]



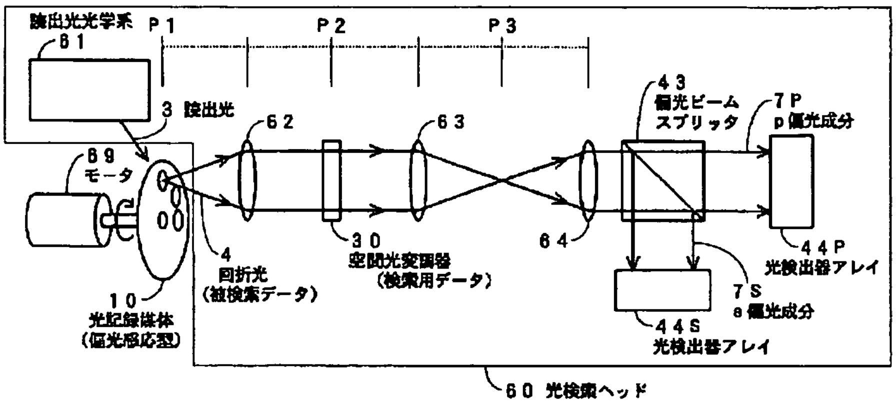
[Drawing 25]



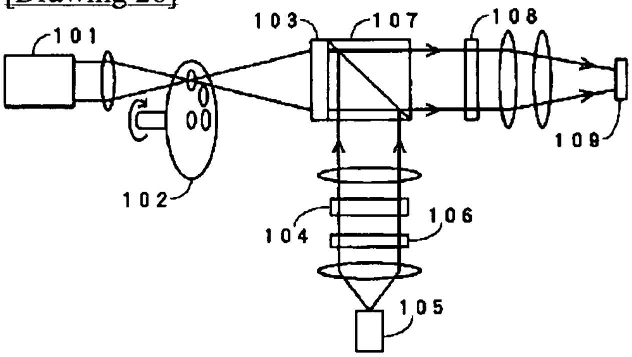
[Drawing 28]



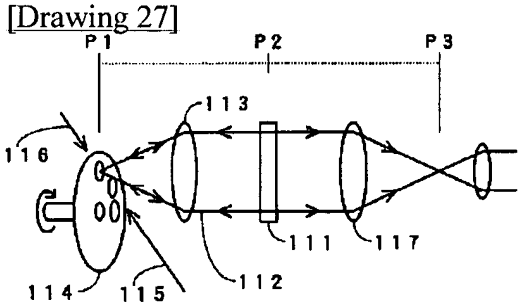
[Drawing 24]



[Drawing 26]



[Drawing 27]



[Translation done.]